



## Early Journal Content on JSTOR, Free to Anyone in the World

This article is one of nearly 500,000 scholarly works digitized and made freely available to everyone in the world by JSTOR.

Known as the Early Journal Content, this set of works include research articles, news, letters, and other writings published in more than 200 of the oldest leading academic journals. The works date from the mid-seventeenth to the early twentieth centuries.

We encourage people to read and share the Early Journal Content openly and to tell others that this resource exists. People may post this content online or redistribute in any way for non-commercial purposes.

Read more about Early Journal Content at <http://about.jstor.org/participate-jstor/individuals/early-journal-content>.

JSTOR is a digital library of academic journals, books, and primary source objects. JSTOR helps people discover, use, and build upon a wide range of content through a powerful research and teaching platform, and preserves this content for future generations. JSTOR is part of ITHAKA, a not-for-profit organization that also includes Ithaka S+R and Portico. For more information about JSTOR, please contact [support@jstor.org](mailto:support@jstor.org).

## FURTHER NOTES ON THE CHROMOSOMES OF THE CERCOPIDÆ.

ALICE M. BORING AND RAYMOND H. FOGLER.

The chromosomes in the spermatogenesis of five species of this family of Hemiptera have already been studied by Stevens<sup>1</sup> and Boring.<sup>2</sup> Three more species have now been studied in comparison with those previously studied. They are *Philaenus lineatus*, *Aphrophora parallela* and *Clastoptera proteus*. Each of these three species belongs to a genus in which one or more species has already been studied, so this gives a chance to compare the spermatogenesis in closely related species. This has been done very carefully by McClung<sup>3</sup> for some families of Orthoptera. The entire family Acrididæ has the same spermatogonial chromosome number, 23, and the Locustidæ has 33, but within each family there are generic and specific cytological differences. The family Cercopidæ of the Hemiptera does not show as closely graded a series of cytological differences as the orthopteran families studied by McClung. The facts as found are here recorded.

The material was collected at Woods Hole<sup>4</sup> and in Orono; *Philaenus lineatus* from grasses, *Aphrophora parallela* from Scotch pines, and *Clastoptera proteus* from alders. Dr. Herbert Osborn has very kindly identified the species of the material. Flemming's and Gilson's solutions were used for fixation, and iron hæmatoxylin for staining.

*Philaenus lineatus* has 29 chromosomes as spermatogonial number (Fig. 1), two of which are larger than the others. The odd chromosome is round or oval in the early (Fig. 2) as well as

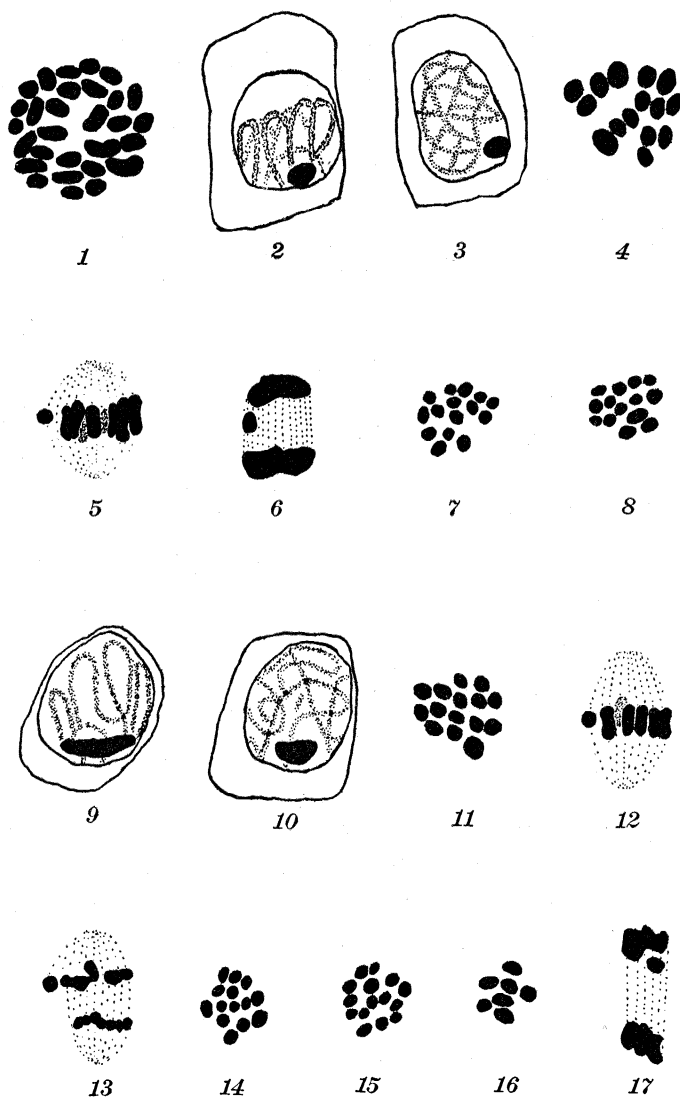
<sup>1</sup> N. M. Stevens, '06, "Studies in Spermatogenesis," Pt. II., Carnegie Institute, Washington.

<sup>2</sup> A. M. Boring, '07, "A Study of the Spermatogenesis in the Membracidæ," etc., *Jour. Exp. Zool.*, 4, p. 469. '13, "The Chromosomes of the Cercopidæ," *Biol. Bull.*, 24, p. 133.

<sup>3</sup> C. E. McClung, '08, "Cytology and Taxonomy," *Kans. Univ. Bull.* 4.

<sup>4</sup> We wish to thank the Director of the Marine Biological Laboratory for the privileges of the laboratory during the summers of 1913 and 1915, at which time this material was collected.

the late (Fig. 3) spireme stages. The reduced number of chromosomes is 15 in the first spermatocytes, one of which is larger than the others (Fig. 4). The odd chromosome is univalent



(Fig. 5) and does not divide in the first spermatocyte division (Fig. 6). The second spermatocytes have partly 15 (Fig. 7)

and partly 14 (Fig. 8) chromosomes. The chromosome number is specific, as the reduced number is 15, while only 12 are found in *Philænus spumarius*. But the roundness of the odd chromosome throughout the spireme stages is a feature common to both species of this genus, and distinguishing it from the species of the genus *Aphrophora*.

*Aphrophora parallela* has 15 chromosomes as reduced number, with one largest chromosome (Fig. 11). The odd chromosome is elongated in the early spireme stages (Fig. 9) and becomes more nearly round in the later stages (Fig. 10). The odd chromosome is, as usual, univalent (Fig. 12) and does not divide in the first spermatocyte division (Fig. 13). The chromosome number in the second spermatocytes is 14 and 15 (Figs. 14 and 15). Again in this species, the chromosome number is different from that in the other species of the same genus, that is, 15, in comparison with 14 in *Aphrophora quadrinotata* and 12 in *Aphrophora spumaria*. The long odd chromosome in the early spireme stages is a common feature of both *A. spumarius* and *A. parallela*, and distinguishes them from the genera *Philænus* and *Clastoptera*. The early spireme stages of *A. quadrinotata* were not studied. The species formerly classified as *A. quadrangularis* has since been put into the genus *Lepyronia*. This species does not possess the long odd chromosome characteristic of the genus *Aphrophora*.

*Clastoptera proteus* has 7 as reduced chromosome number (Fig. 16), one less than the reduced number in *Clastoptera obtusa*. Unfortunately only a few stages were found in this material, so

TABLE I.

Genus.	Species.	Reduced Chromosome Number.
<i>Philænus</i>	<i>spumarius</i> .....	12
"	<i>lineatus</i> .....	15
<i>Aphrophora</i>	<i>spumaria</i> .....	12
"	<i>quadrinotata</i> .....	14
"	<i>parallela</i> .....	15
<i>Lepyronia</i>	<i>quadrangularis</i> .....	11
<i>Clastoptera</i>	<i>proteus</i> .....	7
"	<i>obtusa</i> .....	8

that the only other significant point that was observed was that the first spermatocyte division is the one in which the odd chromosome does not divide (Fig. 17) as in all the species of this family.

The eight species of *Cercopidæ* in which the spermatogenesis has so far been studied belong to four genera. The chromosome number (reduced) varies from 7 to 15. The chromosome number seems to have no significance for family or genus. The specific numbers are shown in Table I.

The odd chromosome in the spireme stages differs in its shape in the genus *Aphrophora* from that in the other genera as far as studied. It is a much elongated structure early in its appearance in *Aphrophora*, while it first appears as an oval or round body in the others.

All eight species of the *Cercopidæ* studied show a typical odd chromosome, which divides only in the second spermatocyte division. In all of the species except *Aphrophora quadrinotata* and *Clastoptera proteus*, in which the material was limited and the equatorial plates consequently not studied in favorable positions, there is one chromosome among the reduced number which is distinctly larger than the others. In no case is the odd chromosome the largest one.

WOODS HOLE,

July 30, 1915.